ಕರ್ನಾಟಕ ರಸ್ತೆ ಅಭಿವೃದ್ಧಿ ನಿಗಮ ನಿಯಮಿತ

Karnataka Road Development Corporation Ltd.

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"Consulting Services for Preparation of Detailed Feasibility Report (DFR) for Development of Road from Nelamangala (NH-4) to Devanahalli Road (NH-07) via Madhure-Byatha-Rajanukunte- Thimmasandra and M.V Solars in Bangalore Urban/Rural district, Karnataka"

EXECUTIVE SUMMARY

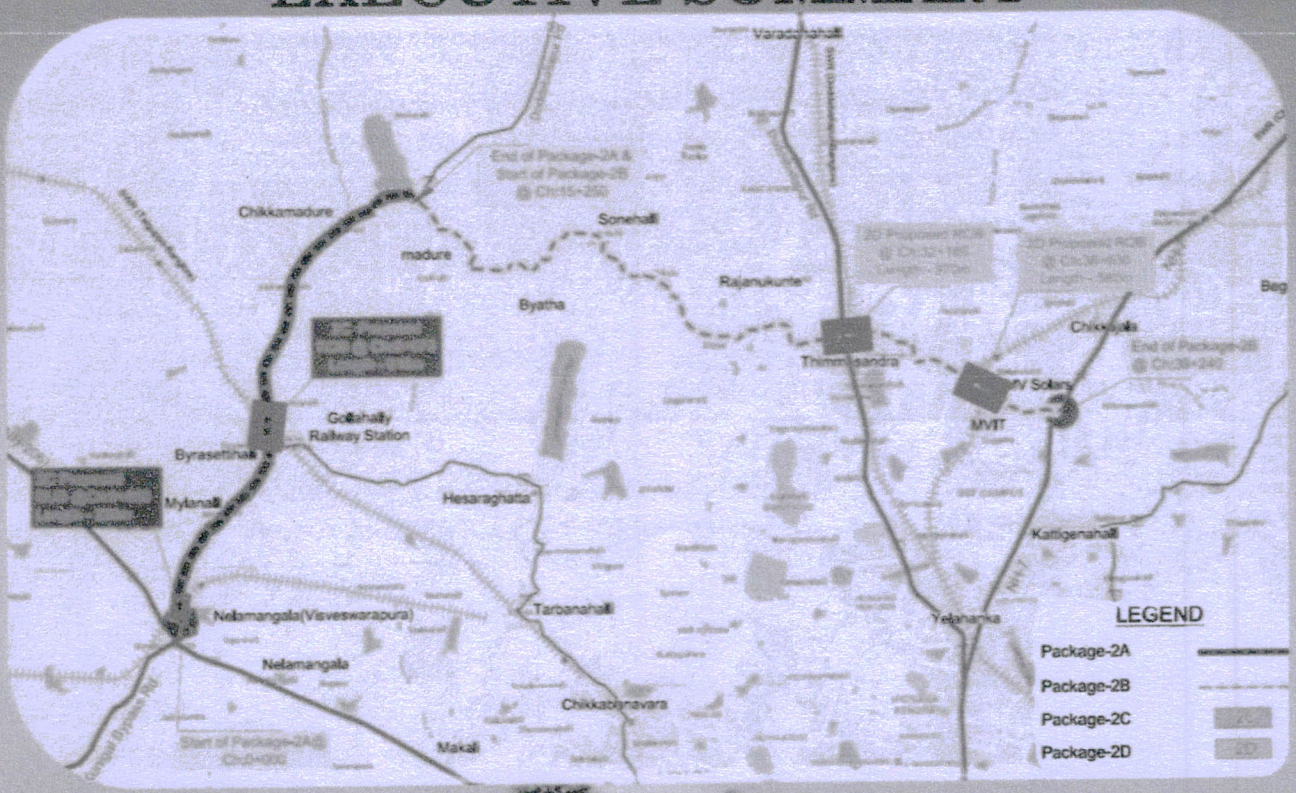

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

E.1 INTRODUCTION

Government of Karnataka has initiated several road development projects. In this regard, KRDCL as envisioned one such project to link alternate road connecting proposed Terminal 2 of Bangalore International Airport.

The Proposed project alignment starts at Nelamangala-Chikkaballapura road junction (off NH-4) and ends at Devanahalli road (NH-7) with a total approximate length of 39.24Kms, via Madhure, Byatha, Rajanukunte, Thimmasandra and MV Solar's on MVIT College road. It is expected that this road grows into an alternative road to reach Bangalore International Airport. Thus, contributing substantially towards development of the local economy, further a number of remote villages are also being provided connectivity.

KRDCL is desirous to obtain Detailed Feasibility Report (DFR) from the Consulting Services, in Bangalore Urban/Rural district, Karnataka with a view to widen and rehabilitating the existing two-lane highway. Karnataka Road Development Corporation Limited (KRDCL) has assigned the task of preparation of the DFR to M/s Infra Support Engineering Consultants Pvt Ltd (ISECPL). The project is coined as "Consulting Services for Preparation of Detailed Feasibility Report (DFR) for Development of Road from Nelamangala (NH-4) to Devanahalli Road (NH-07) via Madhure-Byatha-Rajanukunte-Thimmasandra and M.V Solar's in Bangalore Urban/Rural district, Karnataka.

E.2 SALIENT FEATURES OF PROJECT ROAD

- The project road passes through Chikka-madhure – Byatha – Rajankunte – Thimmasandra, it forms an important artery for movement of Passenger from Nelamangala towards Bangalore International Airport. Total length of the project road is 39.21 km.
- The project stretch is located in the state of Karnataka which is located between 758994.56 m E 1449669.41 m Nand 784034.00 m E 1455420.63 m N.
- Mostly the project road has a two-lane carriageway apart from some urban stretches where the carriageway has intermediate-lane carriageway.
- In general, the terrain is Plain & Rolling. The area is covered with silty soil, Gravel and clay type soil.

- Land use is mainly agricultural with passing through the built-up areas of towns and villages enroute. Important towns along the alignment are Chikka Madhure, Garadigarapalya, Madhure, Byatha, Sonnenahalli, Budumanahalli, Chokkenahalli, Rajanukunte and Thimmasandra at Bangalore Urban/Rural district.
- Nearly 86% of land use is of mixed type which includes built- up areas on left side and right side of carriageway and 14% of the project road has agricultural land/ open/barren land.
- It was found that width of carriageway is varying from 5.5 m to 9.0 m. Shoulders are primarily earthen in composition and width varies from 0.5 to 2.0 m.
- The condition of the existing pavement is categorized as Fair to poor.
- The existing alignment of the road has many substandard curves. The alignment is being improved to meet the minimum design speed applicable to respective terrain classes. The existing horizontal alignment is being followed to the extent possible to avoid undue land and property acquisitions.
- CBR of existing soil varies from 7% to 14%
- BBD (characteristic deflection) value of existing pavement varies from 0.3 to 1.0
- There are 4 No's of major junctions and 47 No's of Minor Junctions along the project section of the project road.
- There are 4 No's of minor bridges, Two number of RUB, One number of ROB and One railway level crossing.
- Four number of railway lines crosses the project road.
- There are 58 numbers of Existing Culverts along the project road. Out of which 9 Nos. are Hume Pipe culvert, 46 Nos. are slab culverts and 3 Nos. are box culverts.

E.3 TRAFFIC

In order to understand the characteristics and the volume of traffic using the project road, traffic volume details and origin-destination of trips of vehicles plying on the project road were collected through primary surveys. For this purpose, a detailed reconnaissance survey was conducted to identify the appropriate locations for carrying out the mid-block count and origin-destination surveys.

Table E-1 : Traffic Survey Schedule

Sl. No	Station No.	Location Name	Date and Duration
Classified Traffic Volume Count			
1	TVC 01	Chokkanahalli Village (At Ch: 28+700 Km)	23.8.2017 (1 Day)
2	TCV 02	Sir MVIT college (At Ch: 38+800 Km)	16.8.2017 (1 Day)
Origin – Destination Survey			
5	TVC 01	Chokkanahalli Village (At Ch: 28+700 Km)	21.8.2017 (1 Day)
6	TCV 02	Sir MVIT college (At Ch: 38+800 Km)	21.8.2017 (1 Day)
Turning Movement Count			
9	TMC 01	Nelmangala-Chikkaballapura road junction (SH-74)	22.8.2017 (1 Day)
10	TMC 02	Garadiagarapalya village (Madhure, Rajankunte, Doddaballapura)	22.8.2017 (1 Day)
11	TMC 03	Chikka madhure- Dodaballapura road (Nelmangala, Yelahanka, Doddaballapura(NH-7)	18.08.2017 (1 Day)
12	TMC 04	ROB approach at Rajanukunte police station (Doddaballapura, NH-7, Nelmangala)	18.08.2017 (1 Day)
13	TMC 05	Narayanpura circle (Rajanukunte, Nagadasanahalli, NH-7, Narayanpura)	19.08.2017 (1 Day)
14	TMC 06	MVIT college NH-7(Rajunkunte cross, Hebbala, Devanahalli)	19.08.2017 (1 Day)

E.3.1 TRAFFIC VOLUME

Table E-2 : Traffic Volumes as observed at different Locations

Location	AADT in Vehicles	AADT in PCU
NEAR Chokkanahalli Village	5972	5689
NEAR MVIT COLLEGE	7999	8257

The traffic volume details for road stretch are studied and found that the capacity is exceeding the required capacity and need capacity augmentation within the available ROW. However, this road warrnts for development of Four lane road

The project starting point is the junction of Nelamangala at the junction of SH-74 (off NH-4 & NH-48) and the alignment passes via Madhure (Kansawadi), Rajanukunte and Thimmasandra and Touches NH-07 at End point of the road near MV Solars.

The traffic coming from Nelamangala and traffic coming from nearby districts are travelling along the proposed road on SH-74. The commercial vehicles destined to airport cargo deviate from SH-74 at Madhure and travel via Doddaballapur, Devanahalli to reach Kempegowda International Airport.

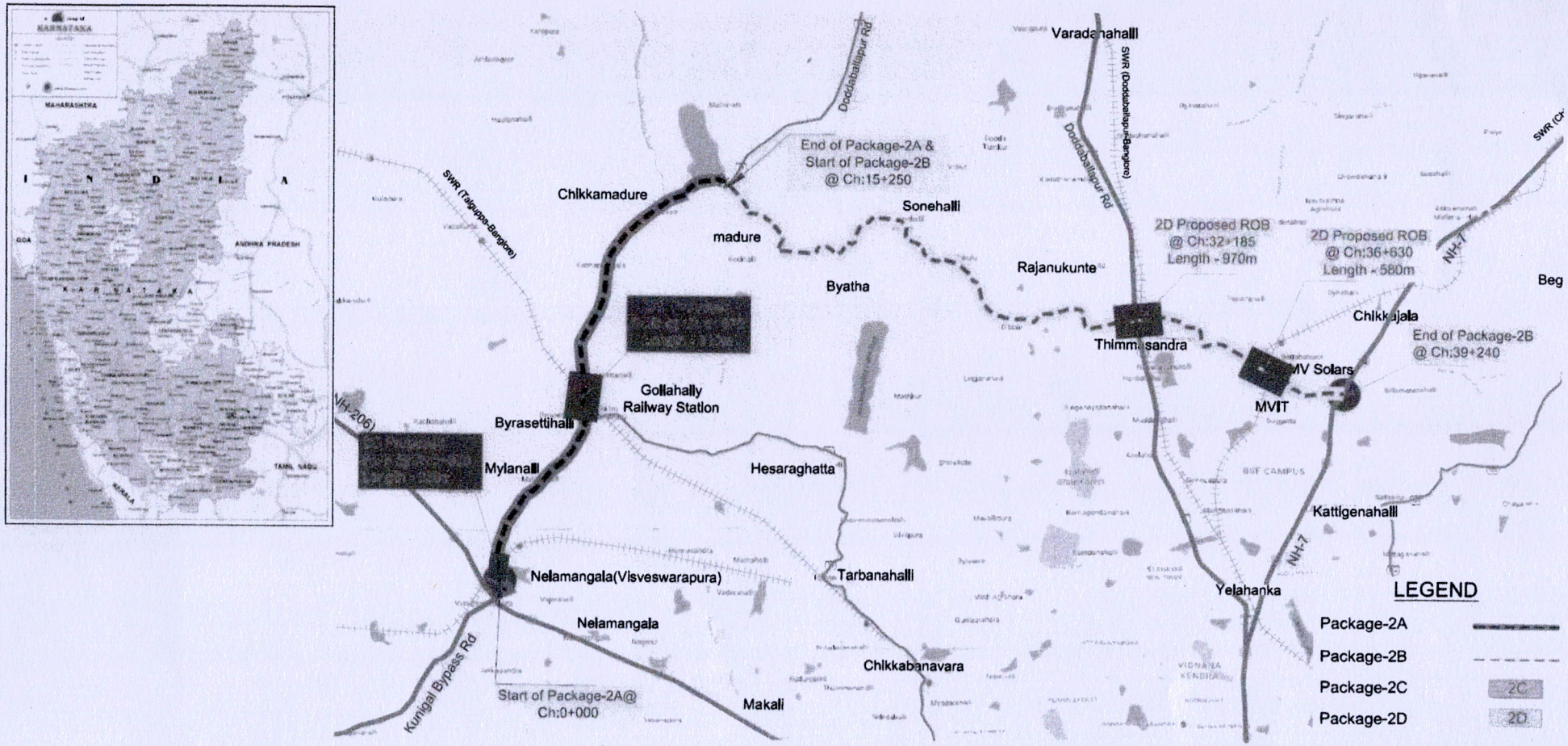

Figure E.1 : Key map showing existing travel pattern around the project road

In conclusion, the section between Nelamangala to Madhure carried reasonable traffic. and Madhure to MV Solars(NH-07 road) has moderate traffic and are potential sections for development. The traffic coming from Nelamangala and traffic coming from nearby districts are travelling along the proposed road on SH-74. The commercial vehicles destined to airport cargo deviate from SH-74 at Madhure and travel via Doddaballapur, Devanahalli to reach Kempegowda International Airport. Hence, the proposed road along SH 74 from Nelamangala to Madhure and MDR from Madhure to NH 07 Road via Rajanukunte, Thimmasandra are potential sections for development.

E.4 ALIGNMENT

The proposed project alignment runs through three major Built ups with a total length of 39.240 Kms, out of which approximately 2.00 Kms length runs in Chikka-madhure, 0.7 Kms runs in Byatha village, 2.6 Kms runs in Rajankunte of Bangalore urban/rural district, Karnataka.

Geometric Design aspect like speed of the alignment mainly depends on the type of terrain. The minimum design speed of 65 Kmph is adopted, to avoid the settlements being acquired, the design speed at some places is restricted to 50 Kmph. Terrain is classified by the general slope of the ground across the highway alignment. The terrain condition is given in below table.

Table E-3 : Terrain Classification

Packages	Length of Stretch (Km)	Terrain	Remarks From – To (Design Chainages)
Package-2	39.240	Plain & rolling	Nelamangala at the junction of SH-74 (off NH-4 & NH-48) to Devanahalli Road (NH-07)
Total Length	**39.240**		

The existing alignment of the road has few substandard curves. The alignment is being improved to meet the minimum design speed applicable to respective terrain classes. The existing horizontal alignment is being followed to the extent possible to avoid undue land and property acquisitions.

E.5 IMPROVEMENT PROPOSALS

The upgradation proposals have been finalised keeping in view the existing geometry, and requirement of the design standards. The improvement proposals are basically proposed with 4 lanes road in rural areas and urban locations. The summary of improvement proposals of Cross Sections are given in the table below.

The total length of package-2 is 39.240 Kms, from which 5.640 Kms length consists of 4-lane rural section, 33.600 Kms length with 4-lane Builtup section. At Chainage 0+800 Kms, Existing RUB is retained with introduction of another box on RHS.

Table E-4 : Summary of Improvement Proposals of Cross Sections

Proposed Cross Section Type	Proposed RoW	Length in Kms
4-Lane Built-up Section without Service Roads and with New Jersey Median	18	31.1
4-Lane Built-up Section with Service Roads and with New Jersey Median	32	0.2
4-Lane Rural Section without Service Roads, with Paved Shoulder and Raised Median (New Construction)	30	1.4
4-Lane Divided Highway without Service Roads, with Paved Shoulder and Raised Median with RHS Retaining wall	30	1.9
4-Lane Divided Highway without Service Roads, with Paved Shoulder and Raised Median	23	0.9
Approach to RuB	19.6	0.21
RuB Section	10	0.02
4-Lane Built-up Section with Service Roads and with New Jersey Median (Approach of RoB)	16.6+5.5+5.5	0.88
LHS Existing ROB Viaduct with Ramp and Proposed RHS Viaduct with Ramp (Rajankunte)	7.5+5.5	0.29

E.5.1 PROPOSED BYPASSES ON PROJECT ROAD

Table E-5 : List of Proposed Bypasses & Realignments

Sl. No.	Name of Town	Start Chainage, in Km	End Chainage, in Km	Length of town to be bypassed in Km	Proposed bypass Length in Km	Bypass / Realignment
Nil						

E.5.2 GRADE SEPERATED STRUCTURES, ROB'S AND RUB'S PROPOSALS

The proposed project road crosses railway track at four locations. The one crossing is existing RUB location at Basavanahalli railway crossing near Nelamangala railway station, proposed with new box on RHS of the alignment. The second railway crossing is at Gollahalli near railway station with existing RUB away from the proposed alignment. The new ROB is proposed along the alignment for Gollahalli railway crossing. The third railway crossing of project road is at Rajanukunte railway station. An additional ROB is proposed along with the existing ROB at this railway crossing. The fourth railway crossing is at-grade level crossing near Narayanapura village. The new ROB is proposed along the project alignment at this railway crossing.

Table E-6 : List of Proposed Grade Separator /ROB/RUB

Sl.No.	Description	Design Chainage	Type of Structure	Remarks
1.	Basavanahalli railway crossing	0+800	RUB	New RHS RUB Construction
2.	Gollahalli railway crossing	6+330	ROB	Proposed RoB above Railway Track along SH
3.	Rajanukunte railway crossing	32+185	ROB	Proposed RoB above Railway Track
4.	Narayanapura railway crossing	36+840	ROB	Proposed RoB above Railway Track

E.5.3 VEHICULAR UNDERPASS

No Vehicular Underpasses are proposed along the project road.

Table E-7 : VUP/LVUP for Project Road

Sl. No	Design Chainage	VUP/LVUP	Dimensions	Remarks
NIL				

E.6 INVENTORY / REHABILITATION /BRIDGES / STRUCTURES

There are 57 numbers of Culverts and 4 no's of minor bridges along this project road.

The proposed structures are summarized with respect to the packages and are given in the table below,

Table E-8 : Summary of Proposed Structures

Type of Structures	Concentric Widening	Reconstruction	New construction	Retained	In Bypasses	Total No. of Structures
Major Bridges	-	-	-	-	-	-
Minor Bridges	1	4	-	-	-	5
Pipe Culverts	-	-	-	-	-	-
Box Culverts	4	49	4	-	-	57
VUP/LVUP	-	-	-	-	-	-
RUB		-	1	-	-	1
ROB	-	-	3	-	-	3
Total No. of Proposed Structures						64

Table E-9 : Proposals of Major Bridges

Sl. No.	Existing Chainage in Kms	Proposed Chainage, in Kms	Proposed Structure				
			No of spans	Width of span (m)	Height (m)	Length (m)	Type
Nil							

Table E-10 : . Proposals for Minor Bridges

Sl. No.	Ext. Chainage in Kms.	Proposed Chainage, in Kms	Proposed Structure				Widening/ Reconstruction	Type
			No of Vents	Width of span (m)	Height (m)	Total length from wall to wall		
1	5+490	5+480	3	2.4	2.5	9	Reconstruction	SLAB BRIDGE
2	13+885	13+870	12	3.9	3	57	RETAIN, REHABITATE,	RCC SOLID SLAB BRIDGE
3	15+250	15+250	16	1.2	2.5	33	Reconstruction	SLAB BRIDGE
4	23+740	23+420	4	6.75	3.5	33.1	Reconstruction	RC GIRDER BRIDGE

E.7 HIGH EMBANKMENTS

Approaches of major bridges, minor bridges, tank and lake bund will have high embankments. The Madhure lake bund along the road has a high embankment varying from 5m to 8m height. The other high embankment location along the road is near Sonnenahalli village along the Kakolu lake bund with height varying from 4m to 6m.

E.8 MAJOR JUNCTIONS

The major road junctions are listed below and all these junctions are being improved as per relevant standards.

There are 4 major intersections in this project road. The configurations for major intersections are presented in tables below.

Table E-11 : Major Intersections /Junctions

Sl No	Design Chainage	Category of Road	Type of Junction	remarks
1	0+000	SH-74	T	Nelmangala To Chikkaballapura road junction (SH-74)
2	15+240	SH	Y	Garadiagarapalya village (Madhure, Rajanukunte, Doddaballapura)
3	32+850	SH	T	Chikka madhure To Dodaballapura road (Nelamangala, Yelahanka, Doddaballapura(SH 09))
4	39+240	NH	T	MVIT college To NH-7 (Rajunkunte cross, Hebbala, Devanahalli

E.9 MINOR JUNCTIONS

The minor road junctions are listed below and all these junctions are being improved as per relevant standards.

There are 47 minor intersections in this project road. The configurations for major intersections are presented in tables below.

Table E-12 : Minor Intersections /Junctions

Sl. No.	Design Chainage km	Intersection Type	Direction	Other features
1	0+310	T	RHS	Krishnarajpalaya
2	0+330	T	LHS	Vishveshpura
3	0+390	T	Both	Byadarahalli Road
4	0+450	T	LHS	Lohithnagar Road

Sl. No.	Design Chainage km	Intersection Type	Direction	Other features
5	0+610	T	LHS	Lohithnagar Road
6	0+770	T	LHS	Nelmangala Station Road
7	0+920	T	LHS	Basavanhalli
8	1+230	Y	LHS	Kanugondanahalli
9	2+140	T	RHS	K. G. Srinivaspura
10	3+140	y	LHS	Mylanahalli Cross
11	3+250	T	LHS	Myalanahalli village Road
12	3+270	T	LHS	Myalahalli village
13	3+350	T	LHS	Myalahalli village
14	3+400	T	LHS	Myalanahalli village Road
15	4+250	y	RHS	Bommasettihalli
16	8+830	T	LHS	Kenjiganahalii
17	12+950	y	LHS	Doddabelavangala Road
18	13+820	T	BOTH	Chikkamadure
19	15+230	y	LHS	Channadevi Agrahara
20	19+910	y	RHS	Byatha Village Limit
21	19+910	y	RHS	Byatha Village Limit
22	21+330	T	LHS	Byatha Village Limit
23	20+120	T	RHS	Byatha Village Limit
24	20+150	T	BOTH	Byatha Village Limit
25	20+210	T	BOTH	Byatha Village Limit
26	20+270	T	BOTH	Byatha Village Limit
27	20+340	T	RHS	Byatha Village Limit
28	20+510	T	BOTH	Byatha Village Limit
29	20+670	T	LHS	Madhure Village Limit
30	20+750	T	LHS	Madhure Village Limit
31	22+560	y	LHS	Madhure Village Limit
32	22+690	T	LHS	Madhure Village Limit
33	22+760	y	LHS	Madhure Village Limit
34	23+320	T	BOTH	Sonnenahalli Village Limit
35	26+970	T	BOTH	Sonnenahalli Village Limit
36	30+010	T	RHS	Chokannahalli Village Limlit
37	30+690	T	RHS	Chokannahalli Village Limlit
38	31+290	T	RHS	Rajanukunte
39	31+410	T	RHS	Rajanukunte
40	32+830	y	RHS	Addiganahalli
41	34+050	T	LHS	Timmasandra
42	36+260	T	BOTH	Timmasandra
43	36+850	T	BOTH	MVIT College Road
44	37+480	T	RHS	MVIT College Road
45	37+830	T	RHS	MVIT College Road
46	38+320	y	LHS	MVIT College Road
47	38+950	T	LHS	MVIT College Road

E.10 CRASH BARRIERS

RCC crash barriers are proposed on both sides of bridges and culverts. Besides that, metallic W beam crash barriers are proposed on both sides of approaches to bridges, any high embankment and outer edges of horizontal curves.

Table E-13 : Crash Barrier Locations

SI. No.	Design Chainage	Length in Mts	SI. No.	Design Chainage	Length in Mts
		BOTH			BOTH
1	0+010	6.5	31	20+370	6
2	0+240	7	32	21+720	10.5
3	0+430	11	33	22+120	6
4	1+020	6	34	22+770	6
5	1+210	6	35	23+020	6
6	1+430	6	36	24+420	6
7	1+710	6	37	25+630	6
8	2+540	6	38	26+810	6
9	2+820	6	39	27+670	6
10	3+790	6	40	28+050	6
11	4+250	6	41	28+380	6
12	4+930	6	42	28+780	6
13	7+080	6	43	29+650	6
14	8+170	6	44	30+180	6
15	8+330	6	45	30+740	6
16	10+880	6	46	31+410	6
17	10+030	6	47	31+760	6
18	10+490	6	48	32+760	6
19	10+510	6	49	33+910	6
20	11+440	6	50	34+350	6
21	15+530	8.5	51	34+950	6
22	16+380	8.5	52	36+800	6
23	16+930	11	53	36+850	6
24	17+150	6	54	37+830	6
25	17+400	6	55	37+840	6
26	18+100	6	56	37+980	6
27	19+260	8.5	57	38+170	6
28	19+350	6.5			
29	19+650	7.5			
30	19+770	6			

Table E-1 : W-Beam metal crash barriers Locations

Sl. No.	Design Chainages		Length (m)	Side	Total Length (m)
	From (Km)	To (Km)			
1	0+257	0+359	102.18	LHS	102.18
2	1+135	1+255	120.00	RHS	120.00
3	2+685	2+840	155.00	RHS	155.00
4	5+450	5+625	175.43	LHS	175.43
5	7+945	8+140	195.00	RHS	195.00
6	10+815	10+945	129.57	RHS	129.57
7	13+230	13+350	120.00	RHS	120.00
8	14+240	14+420	180.08	RHS	180.08
9	14+810	14+995	185.00	RHS	185.00
10	15+650	15+755	105.31	RHS	105.31
11	16+220	16+325	105.39	LHS	105.39
12	16+475	16+585	110.00	RHS	110.00
13	16+765	16+915	150.01	RHS	150.01
14	16+915	17+015	100.00	RHS	100.00
15	17+155	17+260	105.00	LHS	105.00
16	17+275	17+380	105.00	RHS	105.00
17	17+605	17+855	250.00	RHS	250.00
18	17+955	18+325	370.00	LHS	370.00
19	21+050	21+170	119.98	LHS	119.98
20	23+060	23+220	160.00	LHS	160.00
21	23+235	23+375	140.00	RHS	140.00
22	23+380	23+550	170.09	RHS	170.09
23	23+820	23+980	160.00	LHS	160.00
24	23+990	24+150	160.00	RHS	160.00
25	27+250	27+835	585.26	LHS	585.26
26	27+845	28+070	225.40	LHS	225.40
27	28+164	28+290	125.69	LHS	125.69
28	28+320	28+420	100.00	RHS	100.00
29	28+470	28+590	120.00	RHS	120.00
30	29+105	29+410	304.91	RHS	304.91
31	29+786	29+940	154.01	LHS	154.01
32	32+060	32+160	100.00	RHS	100.00
33	33+200	33+345	145.00	LHS	145.00
34	33+780	33+890	110.00	LHS	110.00
35	34+135	34+310	174.77	RHS	174.77
36	36+990	37+155	165.00	LHS	165.00
37	37+340	37+480	140.00	RHS	140.00
Total Length in Km			**6.121**		

E.11 BUS BAYS AND TRUCK LAYBYES

The locations of the Truck laybyes and Busbays are given in table below.

Table E-2 : Proposed Locations of Truck Parking / Laybye

Sl. No.	Packages	Existing Chainage	Design Chainage	Side
Nil				

Table E-3 : Proposed Locations of Bus Bays

Sl. No.	Existing Chainage	Road Name	Design Chainage	Name of Place
1	1+400	MDR	1+390	Nelamangala
2	3+160	MDR	3+150	Myalanahalli 1st Bus Stop
3	3+970	MDR	3+960	Myalanahalli 2nd Bus Stop
4	13+790	MDR	13+770	Chikka Madurai
5	15+280	MDR	15+230	Garadigarapalya
6	20+730	MDR	20+420	Byatha
7	23+030	MDR	22+710	Sonnenahalli
8	31+420	MDR	31+070	Banashankari Layout
9	32+110	MDR	31+760	Rajanukunte
10	32+950	MDR	33+000	Addiganahalli Extension
11	39+190	MDR	39+240	MVIT Cross

E.12 ROAD DELINEATORS

In curved sections, wherever the horizontal curve radius is less than or equal to 1000m delineators are proposed. The provision of delineators has also been made for the approaches of important intersections.

Besides that, the road studs are also proposed on the curved section. Road studs are to be placed on the carriageway along the road centre line and edge lines at suitable intervals as shown in the plan and typical drawing.

E.13 TOLL PLAZA

No Toll Plazas are proposed along the project road.

Table E-4 : Toll Plaza Locations

Sl. No.	Package	Existing Chainage	Design Chainage
Nil			

E.14 REHABILITATION AND RESETTLEMENT PLAN

Even though the up gradation of the project road to 4-lane is likely to bring large number of benefits, a few number of negative impacts are also likely to occur due to land acquisition. A total of 35 Acres of land are proposed to be acquired by keeping 18m ROW in built up section and 23m ROW rural section, for main carriageway and realignment portion to reduce the impact on the existing road

A total of 11 settlements spread out along the project road are likely to be directly / indirectly impacted due to the proposed widening scheme which includes:

- Loss of agriculture / commercial lands
- Loss of residential / commercial buildings
- Loss of sources of income
- Loss of private immovable properties including cultivation lands, commercial / residential buildings, shops, wells, trees, standing crops, etc.,
- Loss of civil amenities.

Appropriate measures have been taken to minimize these impacts, to the maximum possible extent.

The summary of land acquisition is given in below table

Table E-5 : Summary of Land Acquisition Details

Sl. No.	Design Chainage		Non Forest Area in Sqm.	Name of Locations	LA Rates Per Sqm in crores	Amount in Rs
	From	To				
1	0	0+670	0.50	Agricultural land	3	1.49
2	6+610	13+600	2.59	Agricultural land	3	7.77
3	13+600	13+800	0.83	Agricultural land	3	2.49
4	13+800	15+100	3.85	Agricultural land	3	11.56
5	15+250	17+550	1.71	Agricultural land	3	5.12
6	17+550	17+800	1.85	Built up	3	5.56
7	17+800	17+950	0.11	Agricultural land	3	0.33
8	17+950	18+200	1.85	Built up	3	5.56
9	18+200	19+140	0.70	Yelajith	3	2.09
10	19+140	19+550	3.04	Built up	3	9.12
11	19+550	19+800	0.19	Built up	3	0.56
12	19+800	20+090	2.15	Agricultural land	3	6.45
13	20+090	23+500	3.79	Agricultural land	3	11.38
14	23+500	24+100	2.22	Agricultural land	3	6.67
15	24+100	24+340	0.18	Built up	3	0.53
16	24+340	24+520	1.33	Built up	3	4.00
17	24+520	31+560	3.48	Built up	3	10.44
18	32+650	36+500	2.85	Built up	3	8.56
19	37+080	38+340	0.93	Built up	3	2.80
Total Area in Acres			**35**	**Total Cost in crores**		**105.00**

E.15 COST ESTIMATES

The project cost is arrived based on proposals recommended for Four lanes with paved shoulders and typical cross sections arrived. Rate analysis has been worked out considering the Schedule of Rates of PWD SR, Bangalore circle.

Table E-6 : Schedule of Rates Considered

Packages	Chainage		Length, Km	Schedule of Rates Considered.	Area Weightage Considered.
	From	To			
1	Km 000.000	Km 39.240	39.240	PWD SR, Bangalore circle	3%

Total cost of construction for the entire stretch has been worked out and presented.

Table E-7 : Construction Cost For Flexible Pavement

Sl. No	Bill. No.	Description	Package-2A	Package-2B	Package-2C	Package-2D
			Amount (Cr)	Amount (Cr)	Amount (Cr)	Amount (Cr)
1	Bill No.1	SITE CLEARANCE AND DISMANTLING	0.56	0.77	50.00	70.00
2	Bill No.2	EARTH WORK	32.75	32.98		
3	Bill No.3	GRANULAR SUB-BASE AND BASE COURSES	20.77	26.76		
4	Bill No.4	BITUMINOUS COURSES	17.24	27.14		
5	Bill No.5	SLAB, BOX AND PIPE CULVERTS RETAINING WALLS	2.84	5.53		
6	Bill No.6	MAJOR AND MINOR BRIDGES	9.76	13.44		
7	Bill No.7	DRAINAGE AND PROTECTION WORKS	27.65	41.79		
8	Bill No.8	TRAFFIC SIGNS, MARKING AND OTHER APPURTENANCES	16.11	21.54		
9	Bill No.9	BUS BAY	0.17	0.37		
10	Bill No.10	MAJOR AND MINOR JUNCTIONS	4.06	3.92		
11	Bill No.11	RETAINING WALL AND TOE WALL	24.66	-		
		Civil Cost, Rs. Crores	**156.60**	**174.25**	**50.00**	**70.00**
		Physical Contingencies @ 5%	7.85	8.70	2.50	3.50
		DPR & PMC Charges @ 3%	4.70	5.25	1.50	2.10
		KRDCL Administrative Charges @ 5%	7.85	8.70	2.50	3.50
		Road Safety Audit Charges @ 0.5%	0.80	0.90	0.25	0.35
		Price Contingencies @ 5% each for 2 years	15.70	17.45	5.00	7.00
		Total Cost Including Centages	**193.50**	**215.25**	**61.75**	**86.45**
		Land Acquisation Cost, Rs. Crores	**24.05**	**81.05**	**6.08**	**9.83**
		Utility Relocation Cost, Rs. Crores	**15.00**	**20.00**	**1.00**	**1.00**
		Total Project Cost, Rs. Crores	**232.55**	**316.30**	**68.83**	**97.28**
		Length of Project, Km	**14.41**	**22.32**	**0.84**	**1.55**
		Cost Per Km with Centages	**13.43**	**9.64**		
		Cost Per Km Without Centages	**10.87**	**7.81**		
		Cost Per Km Project Cost	**16.14**	**14.17**		

E.16 RECOMMENDATIONS

Final Feasibility study confirmed that rehabilitation and up gradation of the existing road as a whole is technically viable and the following recommendations are made:

- Provision of 18m to 30m ROW in normal section and realignment portion. Proposed length of project road is 39.240 Kms
- Proposed Realignment of length 1.38 Kms.
- Total 63 No's of Bridges and other Structures are being proposed along the project road in which 62 Bridges are proposed,5 No's of Minor Bridges. And 57 numbers of Box culvert Further 1 No's of RUB
- The total land area required is 35 acres.
- The Flexible pavement design has been carried out as per IRC 37:2012 concrete pavement design has been carried out as per IRC 58:2015, based on the projected traffic volume and design subgrade CBR.

The estimated cost for civil works is 450.85 Crores for Flexible.

Table E-8 : Salient Features of the Proposed Project Roads

Sl. No.	Components	Package-1
1	Length of 4-Lane (in Kms)	37.86
3	Realignment (in Kms)	1.38
	Total (in Kms)	39.240
5	No. of Bridges	5
6	No. of Culverts	57
7	No. of RUB	1
	No. of ROB	3
10	No. of Major junction	4
11	No. of Minor Junctions	47
12	No. of Villages	11
14	No. of Bus bays	11